REMARKS

1. Claim Amendments

Claims 13 and 14 have been cancelled. Claims 27-30 have been added. Claims 1-12, and 15-30 are currently pending. Support for the amendments to claims 1, 2, and 7, and for new claims 27-30, may be found in the specification on page 13, line 20 to page 14, line 2. The amendments to claims 10 and 11 merely serve to clarify the nature of the claims and do not constitute new matter nor do they limit the scope of the claims in any way. Support for these amendments may be found in the claims as originally filed and in the specification on page 18, lines 3-8, and in the Examples. The amendment to claim 12 merely serves to provide the claim with proper antecedent basis and does not constitute new matter nor does it limit the scope of the claim in any way. Support for the amendment may be found in the claim as originally filed and throughout the specification, for example on page 13, line 14 and on page 9, lines 19-22. The amendment to Claim 15 merely serves to provide property dependency and does not constitute new matter nor does it limit the scope of the claim in any way.

2. Claim Objections

The Office Action has objected to Claim 19 under the assertion that methacryloxy silane is not a bifunctional compound. Applicants note that Claim 16, but not Claim 19, recites methacryloxy silane, and therefore presume that the reference to Claim 19 was a typographical error. Applicants therefore address the objection under the presumption that it was directed toward Claim 16.

Applicants respectfully submit that the Office has misconstrued the meaning of bifunctional compound in the instant claim. A "bifunctional compound" is defined in the specification, on page 17, lines 18-20, as "contain[ing] a silicon-functional group that hydrolyses and reacts with active sites on the inorganic surface and an organo-functional group that co-polymerizes with free radical cured resin." Thus the bifunctional nature of such compounds is based on their ability 1) to bind to the silicate platelets and 2) to co-polymerize with the resin. Methacryloxy silane binds to the silicate platelets of the compositions of the present invention

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and, as noted in the specification on page 17, line 18, co-polymerizes with methacrylate-based resin, and is thus a "bifunctional compound" as defined in the specification. Applicants thus respectfully request reconsideration and withdraw of the objection to Claim 16.

3. Claim Rejections Under 35 USC § 102(b)

The Office Action has rejected Claims 1-13 and 15-21 as anticipated by Moorman et al. Applicants respectfully traverse. In order to serve as a proper anticipatory reference, the reference in question must teach each and every claim limitation. Claim 1 of the instant application recites "[a] nanocomposite for use in dental applications, the nanocomposite comprising..." (emphasis added). Similarly, independent claims 2 and 7, and dependent claims 3-13 and 15-20, recite nanocomposites. As discussed in the specification (page 7, paragraph 3), nanocomposite technology involves the use of nano-sized particles in the composite material. Nanometer sizes range from 1 to 100 nanometers, as defined in the specification on page 7, line 10. By contrast, Moorman teaches a more conventional composite incorporating micrometer-sized fillers, and does not teach or suggest the nanocomposites of the present invention.

Specifically, Moorman teaches the use of at least 1% of particles having a diameter of at least 30 microns (column 4, lines 1-2), i.e. 30,000 nanometers. Furthermore, Moorman in fact teaches away from the present invention by providing for the use of "very large particles which are of sizes in the range of 0.15 to 2 mm," (column 4, lines 22-23), in stark contrast to compositions of the present invention, which are limited to the use of nanoparticles. As noted in the instant specification on page 7, line 20 to page 8, line 1, the properties of such compositions are in contrast to those of nanocomposites. Thus Moorman does not teach or suggest, but rather teaches away from, the claim limitations of the currently pending claims.

Furthermore, Claim 15, and its dependent claim 16, recites "wherein the at least one surface modifier is used in combination with bifunctional coupling agents or silanes." As discussed in the specification of the pending application (page 17, lines 11-22), the bifunctional compounds of the present invention, when used in combination with the surface modifier, are bound to the silicate platelets on one hand and co-polymerized with the resin on the other. The use of such coupling agents provides increased physical and mechanical properties to the

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compositions of the present invention by, for example, preventing water from penetrating along the silicate/resin interface. In contrast, Moorman teaches "bonding agents" that bind the "particles" (filler), rather than the silicate platelets, to the polymer matrix. Nowhere does Moorman teach or suggest the use of agents to bind the silicate platelets to the polymer resin.

With regard to Claim 21, Moorman neither teaches nor suggests a method of using nanocomposites for dental applications, but rather teaches methods of using compositions containing micrometer-sized particles for manufacturing countertops and sinks.

Thus, as Moorman fails to teach each and every limitation of the pending claims, it is not a proper anticipatory reference under 35 USC §102. Applicants therefore respectfully request the Examiner reconsider and withdraw the rejection of Claims 1-13 and 15-21 over Moorman et al.

4. Claim Rejections Under 35 USC § 102(e)

The Office Action has rejected Claims 1-9, 12, 13, and 17-21 under the assertion that they are anticipated by Lan et al. Applicants note that Claim 13 has been cancelled, thus obviating its rejection.

Applicants have amended Claims 1, 2, and 7, and their dependent claims to recite "wherein the at least one surface modifier is selected from the group consisting of quaternary ammonium ions and primary alkyl ammonium ions." Lan et al. teaches the use of multi-charged onium ions, whereas the claims as presently amended are limited to surface modifiers having a single charge. Lan does not teach nor suggest the use of singly charged ions. Furthermore, with respect to Claim 21, Lan neither teaches nor suggests a method of using nanocomposites for dental applications.

Thus, as Lan fails to teach each and every limitation of the pending claims, it is not a proper anticipatory reference under 35 USC §102. Applicants therefore respectfully request the Examiner reconsider and withdraw the rejection of Claims 1-9, 12, 13, and 17-21 over Lan et al.

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5. Claim Rejections Under 35 USC § 103

(A) The Office Action has rejected Claims 22-26 under the assertion that they are unpatentable over Moorman in view of Gauzauskas. Applicants respectfully traverse. In order to establish a *prima facie* case of obviousness, the cited references much teach or suggest all the claim limitations. For the reasons discussed above, Moorman does not teach or suggest all the claim limitations of the present applications. These deficiencies are in no way cured by Gauzauskas, which teaches a molding composition of fiber reinforced acrylic. The combination of Moorman and Gauzauskas neither teaches nor suggests the nanocomposites of the presently pending claims or their use in dental applications. Thus Gauzauskas does not cure the deficiencies of Moorman. As the combination of Moorman and Gauzauskas does not teach or suggest all the claim limitations of the instant invention, a *prima facie* case of obviousness cannot be established. Hence the Applicants respectfully request the Examiner reconsider and withdraw the rejection of Claims 22-26 under 35 U.S.C. § 103(a).

(B) The Office Action has rejected Claim 14 under the assertion that it is unpatentable over Moorman in view of Kawasumi. Applicants respectfully traverse. In order to establish a *prima facie* case of obviousness, the cited references much teach or suggest all the claim limitations. For the reasons discussed above, Moorman does not teach or suggest all the claim limitations of the present applications. These deficiencies are in no way cured by Kawasumi, which teaches a process for producing a composite of layered clay, polymer, swelling agent, and dispersion medium. The combination of Moorman and Kawasumi neither teaches nor suggests the nanocomposites of the presently pending claims. Thus Kawasumi does not cure the deficiencies of Moorman. Regardless, Applicants note that Claim 14 has been cancelled, thus obviating the rejection.

(C) The Office Action has rejected Claim 14 under the assertion that it is unpatentable over Moorman in view of Bragodia. Applicants respectfully traverse. In order to establish a *prima facie* case of obviousness, the cited references much teach or suggest all the claim limitations. For the reasons discussed above, Moorman does not teach or suggest all the claim limitations of the present applications. These deficiencies are in no way cured by Bragodia, which teaches a process of melt mixing acrylate and similar polymers with layered clay

materials. The combination of Moorman and Bragodia neither teaches nor suggests the nanocomposites of the presently pending claims. Thus Bragodia does not cure the deficiencies of Moorman. Regardless, Applicants note that Claim 14 has been cancelled, thus obviating the rejection.

Applicants respectfully submit that the rejections of the pending claims have been overcome by amendment or traversed by argument and that the pending claims are now in condition for allowance. If the Examiner believes it to be helpful, the Examiner is invited to contact the undersigned representative by telephone at (312) 913-0001.

Respectfully submitted,
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Dated: 1/30/04

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